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Smart Parking System

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ABSTRACT: The project entitled “THE SMART PARKING SYSTEM” presents an IOT based smart parking system which provides an optimal solution for the parking problem in metropolitan cities. Due to rapid increase in vehicle density especially during the peak hours of the day it is difficult task for the users to find the parking space to park their vehicles. This study proposes a smart parking system based on Arduino components and mobile application. The proposed smart parking system consists of an onsite deployment of a slot module that is used to monitor and signalize the state of availability of each single parking space. A mobile application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly. Smart parking can increase the economy by reducing fuel consumption and pollution in urban cities.

KEYWORDS: Low-Cust, High efficiency, maximum output, Energy saving.

I. INTRODUCTION

With growing popularity of Smart Cities, there is always a demand for smart solutions for every domain. The IoT has enabled the possibility of Smart Cities with its over the internet control feature. A person can control the devices installed in his home or office from anywhere in the world by just using a smartphone or any internet connected devices. There are multiple domains in a smart city and Smart Parking is one of the popular domains in the Smart City.

The Smart Parking industry has seen a number of innovations such Smart Parking Management System, Smart Gate Control, Smart Cameras which can detect types of vehicle, ANPR (Automatic Number Plate Recognition), Smart Payment System, Smart Entry System and many more. Today similar approach will be followed and a smart parking solution will be built which will use an ultrasonic sensor to detect vehicle presence and trigger the gate to open or close automatically. The ESP8266 Node MCU will be used here as the main controller to control all the peripherals attached to it.

Due to the increasing number of vehicles caused by rapid population growth in urban areas, the demand on parking infrastructure for the general public has increased significantly. as further points out, finding a free parking space in urban cities especially during peak hours is more or less impossible, in many cases. Looking for a vacant parking lot in a busy city like Helsinki, at a peak hour is a nightmare to drivers. They have to drive around looking for a free parking spot, something that is believed to increase traffic congestion. The cycling around not only frustrates drivers but also increases the average consumption of gas and hence the air pollution that effect the environment.it is also believed that, as drivers' attention partly on a parking for a free spot in a busy city, the likelihood of causing an accident is higher. Another challenge is associated with paying for the parking, most of the time, the machines from which to get the payment ticket are located some distance from the car. The ticket machines too, present some complications since they are not the same; some machines take only coins, or coins plus credit/debit cards or only credit/debit cards. The situation looks like drivers have to prepare for the possibility of any of the above type of ticket machines.

Smart parking is a vehicle parking system that aid drivers to identify empty parking lots. The smart parking system also includes the means of calculating and paying for the time spent in the parking lot. The idea behind such arrangement is that, the system allocates a parking space and automates the payment for the parked time. In addition to establishing the location of vacant parking space and payment for the parking, the system could also include the management of parking permits. Currently, the parking permits are hard copies and digitizing them would be a value addition and a further utilization of the system.

II. CIRCUIT DIAGRAM OF THE SYSTEM:

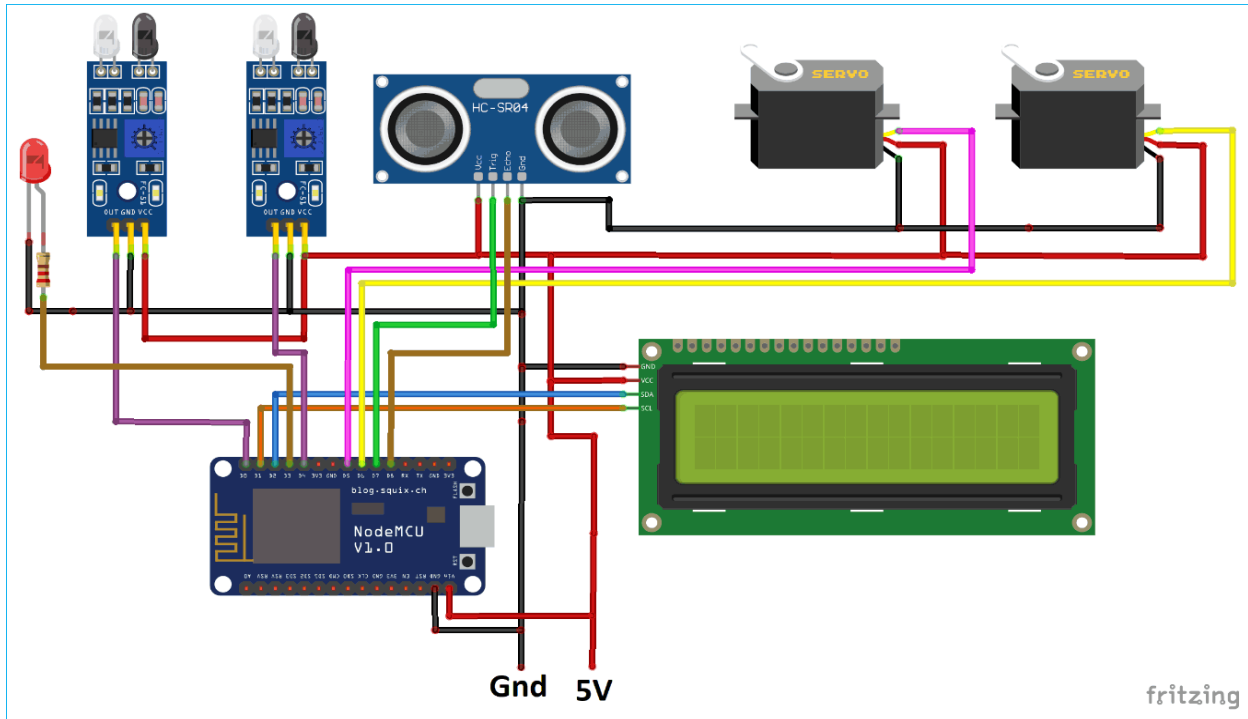


Figure circuit diagram of the system

Circuit diagram for this IoT based vehicle parking system is given. It involves two IR sensor, two to understand the complete working of the project.

Circuit diagram for this IOT based vehicle parking system is given. It involves two servo motors, one ultrasonic sensor and one 16*2 LCD.

Here the ESP8266 will control the complete process and also send the parking availability information to google firebase so that it can be monitored from anywhere in the world over the internet. Two IR sensors are used at entry and exit gate to detect the presence of car and automatically open or closed the gate. IR sensor is used to detect any object by sending and receiving the IR rays.

Two servos will act as entry and exit gate and they rotate to open or close the gate. Finally, an ultrasonic sensor is used to detect if the parking slot is available or occupied and send the data to ESP8266 accordingly. Check the video given at the end of this tutorial to understand the complete working project.

For programming Node MCU, just plug the Node MCU to Computer with a Micro USB Cable and open Arduino IDE. The libraries are required for I2C Display and Servo Motor. The LCD will display the availability of Parking Spaces and the Servo motors will be used to open and close the Entry and Exit gates. The *Wire*'s library will be used to interface LCD in i2c protocol. The Pins for I2C in the ESP8266 Node MCU are D1 (SCL) and D2 (SDA). The database here used will be Firebase so here we are also including the library (*Firebase Arduino. h*) for the same.

ADVANTAGES:

- ✓ There is no need for driving while looking for an available space.
- ✓ Emissions are greatly brought down and reduced.



- ✓ The patrons wait for their car in a highly controlled environment.

DISADVANTAGES:

- ✓ Use of redundant systems will result in a greater cost.
- ✓ It may be a bit confusing for unfamiliar users.

III. CONCLUSION

Looking at the world in our days, Internet Technology has played a very important role in various aspects such as Marketing, Business, Banking and many more. Internet Technology has helped people in building web application.

A good example is the Smart Parking System. The first step of this project was to build a prototype that is connected to the internet to facilitate users to make use of the system. Step two of this project was to make an ease of to allow the parking prototype to communicate with the website of this system.

Many technologies were used to help build the system such as hardware functionalities of MSP8266 NODE MCU, also the Ultrasonic sensors, DC servo motor IR sensor etc. The project has been implemented in different stages such as introduction, requirement, circuit understanding, implementations etc.

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